

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER II, 2019/2020

PMT0101 – MATHEMATICS I
(Foundation in Information Technology)

06 MARCH 2020
9.00 a.m. - 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **FIVE** pages with **FIVE** questions.
2. Attempt **ALL** five questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the answer booklet provided.
4. **No calculator is allowed.**
5. **You are required to write proper step** to obtain maximum marks.

QUESTION 1 [10 marks]

- a) Simplify the following expression and leave your final answer with no negative exponents. Assume that all variables have positive values. Show proper steps.

$$\left[\frac{4y^5}{(x+3)^4} \right]^3 \left[\frac{y^{-4}}{(x+3)^{-2}} \right]^5 \quad [2 \text{ marks}]$$

- b) Rationalize the denominator for $\frac{3+\sqrt{3}}{\sqrt{3}-1}$ and simplify your answer.

[2 marks]

- c) Simplify the radicals and leave the final answer as a single term.

$$2\sqrt{54} - 6\sqrt{\frac{2}{3}} - \sqrt{96} \quad [2 \text{ marks}]$$

- d) Simplify the following expression and leave your final expression as a single fraction.

$$\frac{h-2}{6h^2+12hk} \times \frac{h^2-4k^2}{4h-8} \quad [2 \text{ marks}]$$

- e) Express the following in the form $a+bi$ where a and b are real numbers.

$$\frac{-10-5i}{-2+i} \quad [2 \text{ marks}]$$

Continued...

QUESTION 2 [10 marks]

a) i) Solve the equation $x(2 + 3x) = 16$.

ii) Solve the inequality $\frac{(3x+1)(x-2)}{x-4} \leq 0$.

Leave your final answer in interval notation.

[5 marks]

b) Solve the equation $|4x + 3| = 5$.

[2 marks]

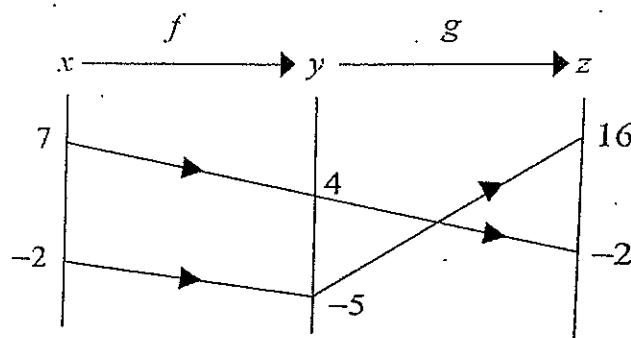
c) Solve the equation $\sqrt{5x+9} = x-1$. Verify the correctness of your answer.

[3 marks]

Continued...

QUESTION 3 [10 marks]

- a) Diagram below shows a function f maps x to y and a function g maps y to z .



Find the following:

- i) $(f^{-1} \circ g^{-1})(-2)$
- ii) $(g \circ f)(-2)$
- iii) $g(4) - f(-2)$

[3 marks]

- b) Determine the domain of the following functions. Write your answer in interval notation.

i) $f(x) = \frac{x-1}{3x+2}$

ii) $g(x) = \sqrt{4-3x}$

[2 marks]

- c) Given the polynomial function $f(x) = x^3(x+3)^2(x-5)$.

- i) What is the **degree** of f ?
- ii) Determine **the zeros** of f **and their multiplicities**.
Also, determine whether the graph of f crosses or touches the x -axis at each zero.
- iii) Determine its y -intercept.
- iv) Determine the end behavior of f .
- v) Sketch the graph of the polynomial function.
Make sure your graph shows all intercepts and exhibits the proper end behaviour.

[5 marks]

Continued...

QUESTION 4 [10 marks]

- a) An equation of a curve is $y = p(x+h)^2 + k$, where p, h and k are constants. The curve has a minimum point $(3, 4)$ and passes through point $(1, 12)$.

- i) Find the values of p, h and k .
ii) Find the y -intercept of the curve.

[3 marks]

- b) Solve the equation $2^{n+2} \div 3^{n+1} = \frac{16}{27}$.

[2 marks]

- c) Given $2 \log_{10}(x^2 y) = 3 + \log_{10} x - \log_{10} y$, express y in terms of x .

[2.5 marks]

- d) The graph of a function $f(x) = e^{3x-6} + 1$ passes through point $(t, 2)$.

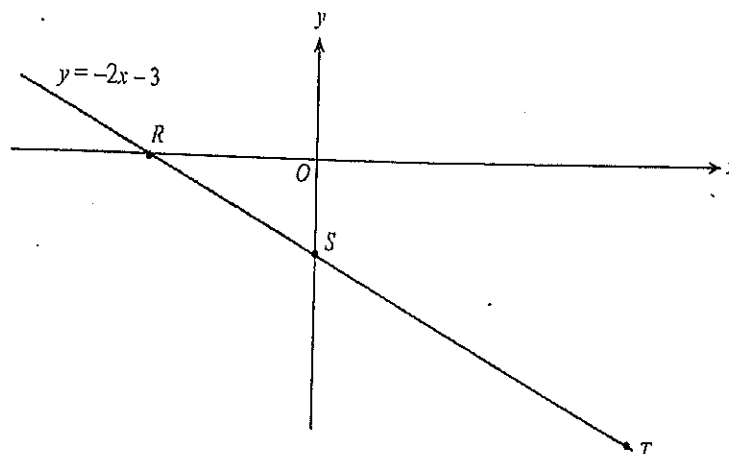
- i) Find the value of t .
ii) Find the y -intercept.

[2.5 marks]

Continued...

QUESTION 5 [10 marks]

- a) Diagram below shows a straight line RST that has an equation $y = -2x - 3$.



The line intersects the x -axis and the y -axis at points R and S , respectively.

- Find the coordinates of R and S .
- Given that $RS : ST = 1 : 2$, find the coordinates of T .
- Find an equation of a straight line that passes through point S and is perpendicular to the line RST .
- A point $P(x, y)$ moves such that its distance is always 5 units from the point S . Find an equation of the locus of P .
Write your final answer in the form $x^2 + y^2 + ax + by + c = 0$ where a, b and c are constants.

[6 marks]

- b) An equation of a circle is $x^2 + y^2 - 4x + 6y - 10 = 0$.

- By completing the square, transform the equation to the form $(x - h)^2 + (y - k)^2 = r^2$, where h, k and r are constants.
- Find the center and radius of the circle.
- Determine whether the circle intersects the y -axis or not. Show your working.

[4 marks]

End of Page.